

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
16 February 2012 (16.02.2012)

PCT

(10) International Publication Number  
**WO 2012/021887 A3**

(51) International Patent Classification:  
*G01N 33/574* (2006.01)

(21) International Application Number:  
PCT/US2011/047741

(22) International Filing Date:  
15 August 2011 (15.08.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
61/373,359 13 August 2010 (13.08.2010) US

(71) Applicants (for all designated States except US): **ARIZONA BORAD OF REGENTS, A BODY CORPORATE ACTING FOR AND ON BEHALF OF ARIZONA STATE UNIVERSITY** [US/US]; 1475 N. Scottsdale Road, Skysong, Suite 200, Scottsdale, AZ 85257 (US). **DANA-FARBER CANCER INSTITUTE, INC.** [US/US]; 44 Binney Street, Boston, MA 02115 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **LABAER, Joshua** [US/US]; 5360 S. Miller Place, Chandler, AZ 85249 (US). **ANDERSON, Karen, Sue** [US/US]; 213 Reservoir Road, Chestnut Hill, MA 02467 (US). **WALLSTROM, Garrick** [US/US]; 2619 South Los Altos, Mesa, AZ 85202 (US). **SIBANI, Sahar** [CA/US]; 259 Lantern Road, Apt. 38, Revere, MA 02151 (US). **RAMACHANDRAN, Niroshan** [CA/US]; 1523 Crescent Place, San Marcos, CA 92078 (US).

(74) Agent: **HARPER, David, S.**; McDonnell Boehnen Hulbert & Berghoff LLP, 300 South Wacker Drive, Suite 3100, Chicago, IL 60606 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))
- with sequence listing part of description (Rule 5.2(a))

(88) Date of publication of the international search report:  
10 May 2012

(54) Title: BIOMARKERS FOR THE EARLY DETECTION OF BREAST CANCER

(57) Abstract: The present invention provides reagents and methods for breast cancer detection.



WO 2012/021887 A3

**INTERNATIONAL SEARCH REPORT**

International application No  
PCT/US2011/047741

**A. CLASSIFICATION OF SUBJECT MATTER**  
 INV. G01N33/574  
 ADD.  
 According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**  
 Minimum documentation searched (classification system followed by classification symbols)  
 G01N  
 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)  
 EPO-Internal, BIOSIS, EMBASE, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CHAPMAN ET AL: "Autoantibodies in breast cancer: their use as an aid to early diagnosis", ANNALS OF ONCOLOGY, KLUWER ACADEMIC PUBLISHERS, DO, vol. 18, 7 March 2007 (2007-03-07), pages 868-873, XP002458472, ISSN: 1569-8041, DOI: 10.1093/ANNONC/MDM007 abstract <p align="center">----- -/--</p>	1-18

Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search  17 November 2011	Date of mailing of the international search report  23/03/2012
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  Hohwy, Morten
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## INTERNATIONAL SEARCH REPORT

International application No

PCT/US2011/047741

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	KAREN S. ANDERSON ET AL: "Protein Microarray Signature of Autoantibody Biomarkers for the Early Detection of Breast Cancer", JOURNAL OF PROTEOME RESEARCH, vol. 10, no. 1, 7 January 2011 (2011-01-07), pages 85-96, XP055012289, ISSN: 1535-3893, DOI: 10.1021/pr100686b the whole document	1-18
Y	----- WO 2008/030845 A2 (VERIDEX LLC [US]; WANG YIXIN [US]; YU JACK X [US]; ZHANG YI [US]) 13 March 2008 (2008-03-13)	8-18
A	Table 5, p. 19	1-7
X	----- F. S. HODI: "ATP6S1 elicits potent humoral responses associated with immune-mediated tumor destruction", PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, vol. 99, no. 10, 14 May 2002 (2002-05-14), pages 6919-6924, XP055012298, ISSN: 0027-8424, DOI: 10.1073/pnas.102025999	8-13
Y	p. 6920-6921, bridging par.; Fig. 2	14-18
A		1-7
Y	----- H. ZHAO: "Different Gene Expression Patterns in Invasive Lobular and Ductal Carcinomas of the Breast", MOLECULAR BIOLOGY OF THE CELL, vol. 15, no. 6, 1 January 2004 (2004-01-01), pages 2523-2536, XP055012300, ISSN: 1059-1524, DOI: 10.1091/mbc.E03-11-0786	8-18
A	the whole document	1-7
Y	----- RAMACHANDRAN NIROSHAN ET AL: "Self-assembling protein microarrays", SCIENCE, AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, WASHINGTON, DC; US, vol. 305, no. 5680, 2 July 2004 (2004-07-02), pages 86-90, XP002441078, ISSN: 0036-8075, DOI: 10.1126/SCIENCE.1097639 Fig. 1 and caption	14-18
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2011/047741

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2008030845	A2	13-03-2008	
		CA 2662501 A1	13-03-2008
		CN 101573453 A	04-11-2009
		EP 2061905 A2	27-05-2009
		JP 2010502227 A	28-01-2010
		US 2008182246 A1	31-07-2008
		WO 2008030845 A2	13-03-2008
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# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2011/047741

## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

2, 9, 15(completely); 1, 3-8, 10-14, 16-18(partially)

### Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 2, 9, 15(completely); 1, 3-8, 10-14, 16-18(partially)

Methods, compounds, and arrays for diagnosing breast cancer by detection of antibodies to a polypeptide, wherein the polypeptide is ATP6AP1 (SEQ. ID. NO: 13).

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2-28. claims: 1, 3-8, 10-14, 16-18(all partially)

Methods, compounds, and arrays for diagnosing breast cancer by detection of antibodies to a polypeptide, wherein the polypeptide for Invention n is the n'th polypeptides listed in claim 1 (For Invention 2, the polypeptide is PDCD6IP, for Invention 3, it is DBT and so on).

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